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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOCHEN ACKERMAN,
HORST HILTNER, and HERMANN SIEGERT

Appeal 2009-011372
Application 10/541,307
Technology Center 1600

Decided:¹ July 1, 2010

Before CAROL A. SPIEGEL, TONI R. SCHEINER, and
FRANCISCO C. PRATS, *Administrative Patent Judges*.

PRATS, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal under 35 U.S.C. § 134 involves claims to methods of preparing methacrylic acid esters. The Examiner rejected the claims for lack of descriptive support, indefiniteness, and obviousness.

We have jurisdiction under 35 U.S.C. § 6(b).

¹ Oral argument was presented in this case on June 23, 2010.

We affirm the written description except as to one claim.

We reverse the indefiniteness rejection.

We also reverse the obvious rejection except as to one claim.

STATEMENT OF THE CASE

Claims 1-22 are pending and on appeal (App. Br. 2). Claims 1 and 20 are illustrative, and read as follows:

Claim 1: A process for continuously preparing higher (meth)acrylic esters (C) in a plant comprising a reaction apparatus and a vacuum evaporation stage for receiving a bottom product remaining after separation of a highly pure ester product, the process comprising:

transesterifying methyl(meth)acrylate (A) with a higher alcohol (B) in the presence of a catalyst or catalyst mixture in the reaction apparatus;

dividing a bottom effluent from the vacuum evaporation stage into a first portion and a second portion; and

recycling the first portion to the reaction apparatus;

wherein dividing the bottom effluent from the vacuum evaporation stage comprises selecting a proportion of the bottom effluent that will constitute the first portion based on current catalyst activity.

Claim 20: A process for continuously preparing higher (meth)acrylic esters (C) in a plant comprising a reaction apparatus and a vacuum evaporation stage for receiving a bottom product remaining after separation of a highly pure ester product, the process comprising:

transesterifying methyl(meth)acrylate (A) with a higher alcohol (B) in the presence of a catalyst or catalyst mixture in the reaction apparatus;

dividing a bottom effluent from the vacuum evaporation stage into a first portion and a second portion; and

recycling the first portion to the reaction apparatus;

wherein the first portion is recycled directly to the reaction apparatus.

The claims stand rejected as follows:

- (1) Claims 20-22, under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement (Ans. 4-5);
- (2) Claims 1-3, under 35 U.S.C. § 112, second paragraph, as indefinite (Ans. 5); and
- (3) Claims 1-22, under 35 U.S.C. § 103(a) obvious in view of Geisendoerfer² et al. (Ans. 6-9).

WRITTEN DESCRIPTION

ISSUE

The Examiner finds, with respect to claims 20-22, that “[t]here is no evidence in the record for the claim language of ‘wherein the first portion is recycled directly to the reaction apparatus’ and ‘wherein the third portion is recycled directly to the reaction apparatus’, at the time of filing the application” (Ans. 5). Thus, the Examiner reasons, “the suggested new claims raise an issue of new matter” (*id.*).

Appellants contend that Figures 2 through 4 of the application “plainly show a recycled stream 18 that is returned directly from the film evaporator 5 or the vacuum evaporation stage 6 to the reaction apparatus 1 - that is, there are no apparatus components (or associated processing) between the film evaporator 5 or the vacuum evaporation stage 6 and the reaction apparatus 1” (App. Br. 7).

² U.S. Patent Application Publication No. 2004/0171868 A1 (published Sep. 2, 2004).

In view of the positions advanced by Appellants and the Examiner, the issue with respect to this rejection is whether Figures 2 through 4 of the instant application would have adequately conveyed to an ordinary artisan that Appellants invented the processes recited in claims 20-22, in which a portion of the bottom effluent from the vacuum evaporation stage and/or film evaporator is “recycled directly to the reaction apparatus.”

FINDINGS OF FACT ("FF")

1. Appellants' Figure 2, reproduced below, is a schematic representation of one embodiment of Appellants' process in which the catalyst-containing effluent resulting from the transesterification reaction performed in the reaction apparatus 1 is recycled back to the reaction apparatus after being subjected to several post-synthesis processing steps:

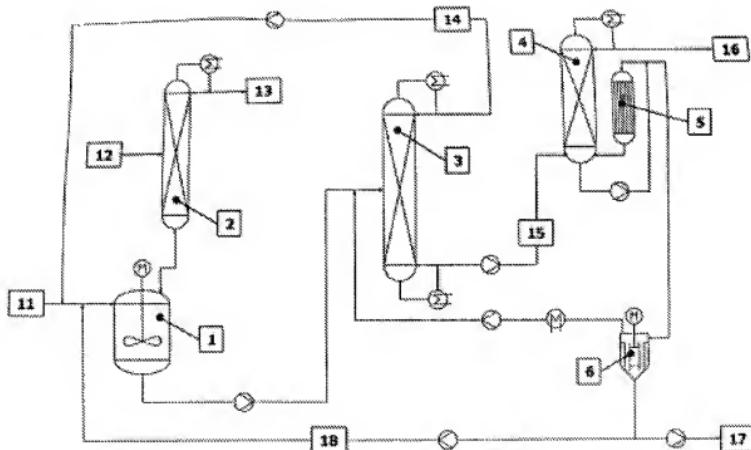


Figure 2: Solution variant 1

Figure 2 shows that the “bottom effluent of the vacuum evaporation stage (6) which comprises the catalyst, polymerization inhibitors, and also high-boiling by-products and residual product ester is divided and recycled partly (18) to the reaction apparatus (1). The remaining residual stream is discharged (17)” (Spec. 13).

2. As seen Figure 2, the recycled stream 18 portion of the bottom effluent from vacuum evaporation stage 6 is recycled directly into reaction apparatus 1 (see Spec. 13 for apparatus references).

3. Appellants’ Figure 3, reproduced below, is a schematic representation of another embodiment of Appellants’ process in which the catalyst used in the reaction is recycled:

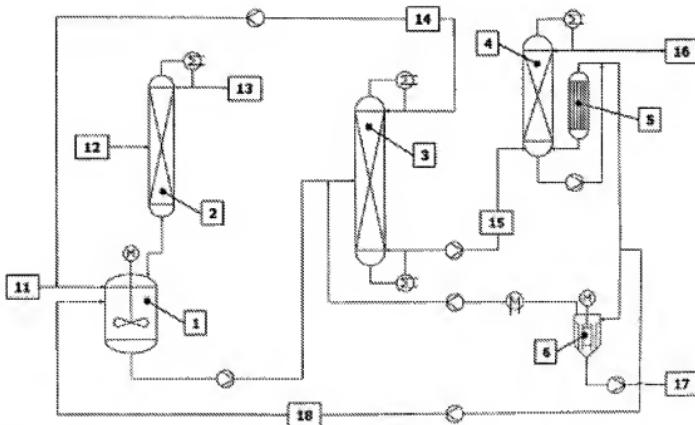


Figure 3: Solution variant 2

Figure 3 shows the “bottom effluent from the apparatus employing gentle film evaporation (5) which remains after the highly pure product ester has been removed and comprises the catalyst, polymerization inhibitors and

also high-boiling by-products and residual product ester is divided and recycled in part (18) into the reaction apparatus (1)" (Spec. 14).

4. As seen in Figure 3, a bottom effluent stream from the film evaporator 5 passes into high boiler distillation column 4. The bottom effluent from distillation column 4 is fed into a stream which delivers a portion back into film evaporator 5, a portion into vacuum evaporation stage 6, and a portion into recycle stream 18.

5. According to the Specification, high boiler distillation column 4 and film evaporator 5 form a two-apparatus vacuum distillation stage for removing high-boiling byproducts from the pure product ester (Spec. 9 and 14).

6. Appellants' Figure 4, reproduced below, is a schematic representation of a third embodiment of Appellants' process in which the catalyst used in the reaction is recycled:

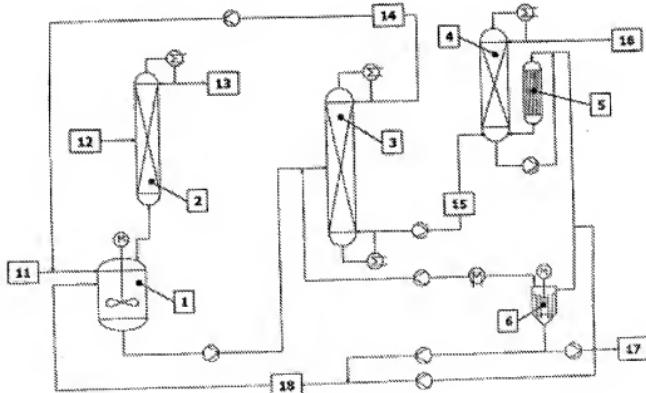


Figure 4: Solution variant 3

Figure 4 shows:

The bottom effluent from the apparatus employing gentle film evaporation (5) which remains after the highly pure product ester has been removed and comprises the catalyst, polymerization inhibitors and also high-boiling by-products and residual product ester is divided and recycled in part (18) into the reaction apparatus (1). . . . The bottom effluent of the vacuum evaporation stage (6) which comprises the catalyst, polymerization inhibitors and also high-boiling by-products and residual product ester is divided and likewise partly recycled (18) into the reaction apparatus (1).

(Spec. 14-15.)

7. As seen in Figure 4, the recycled stream 18 portion of the bottom effluent from vacuum evaporation stage 6 is recycled directly into reaction apparatus 1.
8. As also seen in Figure 4, the bottom effluent from distillation column 4 is fed into a stream which delivers a portion back into film evaporator 5, a portion into vacuum evaporation stage 6, and a portion into recycle stream 18.

PRINCIPLES OF LAW

As stated in *TurboCare Div. of Demag Delaval Turbomachinery Corp. v. General Elec. Co.*, 264 F.3d 1111, 1118 (Fed. Cir. 2001):

The written description requirement and its corollary, the new matter prohibition of 35 U.S.C. § 132, both serve to ensure that the patent applicant was in full possession of the claimed subject matter on the application filing date. When the applicant adds a claim or otherwise amends his specification after the original filing date . . . , the new claims or other added material must find support in the original specification.

Thus, as the Federal Circuit stated in *Ariad Pharmaceuticals, Inc. v. Eli Lilly and Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010), the “test for sufficiency is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.”

Beyond simple possession, however, the court explained that the “test requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art. Based on that inquiry, the specification must describe an invention understandable to that skilled artisan and show that the inventor actually invented the invention claimed.” *Id.*

ANALYSIS

We agree with Appellants that Figure 2 of the instant application would have reasonably conveyed to an ordinary artisan that Appellants invented the process recite in claim 20.

Specifically, claim 20 recites a process for continuously preparing higher (meth)acrylic esters in a plant that has a reaction apparatus and a vacuum evaporation stage for receiving a bottom product remaining after separation of a highly pure ester product. Claim 20 recites the steps of (a) transesterifying methyl(meth)acrylate with a higher alcohol in the presence of a catalyst or catalyst mixture in the reaction apparatus, (b) dividing a bottom effluent from the vacuum evaporation stage into a first portion and a second portion, and (c) recycling the first portion to the reaction apparatus.

Claim 20 also specifies, in the language at issue, that “the first portion is recycled directly to the reaction apparatus.” We conclude that the broadest reasonable interpretation of this recitation is that, once a bottom

effluent from the vacuum evaporation stage is divided into two portions, one of the portions must proceed to the reaction apparatus without any intervening processing steps or apparatuses.

As noted above, Figure 2 shows that the recycled stream 18 portion of the bottom effluent from vacuum evaporation stage 6 is recycled directly into reaction apparatus 1 (FF 1, 2). We therefore find that the recitation at issue in claim 20 is adequately supported by Figure 2. Accordingly, we reverse the Examiner's written description of claim 20.

Process claims 21 and 22, however, recite "dividing a bottom effluent from the film evaporator into a first portion and a second portion; and recycling the first portion to the reaction apparatus; wherein the first portion is recycled directly to the reaction apparatus." Contrary to Appellants' contention, neither Figure 3 nor Figure 4 of the instant Application supports this limitation. Specifically, in both Figures 3 and 4, a bottom effluent stream from the film evaporator 5 passes into high boiler distillation column 4. The bottom effluent from distillation column 4 is fed into a stream which delivers a portion back into film evaporator 5, a portion into vacuum evaporation stage 6, and a portion into recycle stream 18. (FF 4, 8.) We note that the Specification describes high boiler distillation column 4 and film evaporator 5 as forming a two-apparatus vacuum distillation stage for removing high-boiling byproducts from the pure product ester (FF 5). However, both claims 21 and 22 require the bottom effluent from the film evaporator, not a vacuum distillation stage, be divided into two portions, one of which is recycled directly to the reaction apparatus.

Therefore, we sustain the Examiner's written description rejection of claims 21 and 22.

INDEFINITENESS

ISSUE

The Examiner concludes that the recitation ““current catalyst activity”” in claims 1-3 renders those claims indefinite under 35 U.S.C. § 112, second paragraph (Ans. 5). Specifically, the Examiner concludes that “[i]t is unclear what defines this current catalyst activity. Does the first portion increase the current catalyst activity or decrease it? Is the first portion selected and divided based on an active or inactive catalyst?” (*id.*).

Appellants contend that, “[a]s is plain, e.g., from the Examples of the present specification (see pages 15 to 24), the very purpose of the processes of claims 1-3 is to obtain a high yield of an alkyl(meth)acrylate using a[s] little catalyst as possible” (App. Br. 8). Moreover, Appellants argue, “current catalyst activity can be determined, e.g., by measuring alcohol or MMA [methyl(methacrylate)] conversion” (*id.* at 9 (citing Spec. 13:8-11)).

Thus, Appellants argue:

According to claims 1-3, the amount of bottom effluent (which includes used catalyst) that is returned to the reaction apparatus is determined based on current catalyst activity. For example, if the yield of alkyl(meth)acrylate is high, a greater amount of catalyst could be recycled, while if the yield of alkyl(meth)acrylate is low, a smaller amount of catalyst could be recycled.

(*Id.*)

Accordingly, Appellants conclude, an ordinary artisan “could readily determine whether current catalyst activity is being measured in terms of, e.g., yield of the desired alkyl(meth)acrylate and, thus, could readily determine whether a subject process falls within or outside the scope of the present claims” (Reply Br. 3).

In view of the positions advanced by Appellants and the Examiner, the issue with respect to this rejection is whether an ordinary artisan viewing claims 1-3 in light of the Specification would have been apprised of the meaning of the claim requirement that “dividing a bottom effluent . . . comprises selecting a proportion of the bottom effluent that will constitute the first portion based on current catalyst activity.”

FINDINGS OF FACT

9. The Specification discloses an “improved continuous process for preparing alkyl (meth)acrylates (C) by continuously transesterifying methyl (meth)acrylate (A) with alcohols (B) to release methanol (D)” (Spec. 1).

10. The Specification discloses that the “improvement over the prior art is that the homogeneous tetraalkyl titanate (tetraalkoxytitanium) catalyst which is used with preference can surprisingly be used repeatedly by recycling. This decisively reduces the catalyst consumption and consequently the costs of the auxiliaries, which again distinctly increases the economic viability of the process” (*id.* at 4).

11. The Specification discloses that the “amount of catalyst which is recycled is controlled with the aid of alcohol (B) or MMA (A) conversion in the reaction apparatus (1) as a measure of the current catalyst activity. A further indicator which can be used for the current catalyst activity is the amount and composition of the low boiler cycle stream (14)” (Spec. 13).

12. Thus, the “amount of catalyst in the [initial reactant] stream (11) is reduced in proportion to the recycled amount of catalyst compared to the operation without catalyst recycling” (*id.*).

13. Appellants’ Example 2 discloses a process in which the reaction conditions were followed to determine the percentage of conversion n-

butanol (n-BuOH), the higher alcohol used in the transesterification process (*id.* at 21).

PRINCIPLES OF LAW

“The legal standard for definiteness is whether a claim reasonably apprises those of ordinary skill in the art of its scope.” *In re Warmerdam*, 33 F.3d 1354, 1361 (Fed. Cir. 1994).

ANALYSIS

We do not agree with the Examiner that, when claims 1-3 are read in light of the Specification, an ordinary artisan would not have understood the meaning of the claim requirement that “dividing a bottom effluent . . . comprises selecting a proportion of the bottom effluent that will constitute the first portion based on current catalyst activity.”

As noted above, the Specification describes the improvement of the disclosed process over the prior art as being recycling of the catalyst (FF 10). As Appellants point out, page 13 of the Specification explicitly states that the amount of catalyst to be recycled “is controlled with the aid of alcohol (B) or MMA (A) conversion in the reaction apparatus (1) *as a measure of the current catalyst activity*. A further indicator which can be used for the *current catalyst activity* is the amount and composition of the low boiler cycle stream (14)” (FF 11 (emphases added)). The Specification provides an example in which the reaction is monitored to determine the catalyst activity based on the degree of higher alcohol conversion (FF 13).

The Specification further notes that the “amount of catalyst in the [initial reactant] stream (11) is reduced in proportion to the recycled amount of catalyst compared to the operation without catalyst recycling” (Spec. 13 (FF 12)).

Based on this description, a skilled artisan would understand current catalyst activity to be a measure of either the higher alcohol or methyl(methacrylate) conversion percentage in the reaction apparatus, or the composition of the low boiler stream. Moreover, by requiring the practitioner to “select[] a proportion of the bottom effluent that will constitute the first portion based on current catalyst activity,” a skilled artisan would understand that claims 1-3 require the practitioner to measure current catalyst activity in the reaction apparatus, for example by the described methods, and to adjust the amount of effluent recycled to the reaction apparatus based on the amount of catalyst activity remaining.

Accordingly, as we conclude that an ordinary artisan would have understood the scope of the claim term “current catalyst activity” when claims 1-3 are viewed in light of the relevant description in the Specification, we reverse the Examiner’s rejection of claims 1-3 under 35 U.S.C. § 112, second paragraph.

OBVIOUSNESS

ISSUE

In rejecting claims 1-22 as obvious over Geisendoerfer, the Examiner finds that Geisendoerfer differs from independent claims 1-3 in that the reference does not describe the step of “selecting a portion of the bottom effluent that will constitute the first portion based on current catalyst activity” (Ans. 7).

The Examiner finds, however, that Geisendoerfer teaches catalyst removal by “thin-film or flash evaporation (page 8, section 166 and 167) in which the bottom product which contains the catalyst (page 8, section 169)

is partly recycled back into the reaction apparatus (page 8, section 170)” (Ans. 8). Moreover, the Examiner urges, Geisendoerfer “teaches that there are advantages to interchanging and combining these steps based on exposure to the catalyst and so that catalyst-induced secondary or subsequent reactions are reduced (page 8, section 172 and 173). Thus, Geisendoerfer et al. envisions a link to the process steps and catalyst activity” (Ans. 8).

Based on these teachings, the Examiner reasons that an ordinary artisan

would have recognized that catalyst activity is a result effective variable as clearly evidenced by the cited teachings from Geisendoerfer. Therefore, it would have been obvious to one of skill in the art at the time the invention was made to optimize the amount of effluent recycled back to the reaction chamber based on activity of the catalyst.

(*Id.* at 12.)

Regarding independent claims 20-22, the Examiner finds that Geisendoerfer “does teach that a portion of the bottom mixture is partly recycled directly to the transesterification reaction apparatus (page 8, section 170). In addition, the art teaches that there are advantages to interchanging, combining and giving preference to certain steps (page 8, section 171 and 173)” (Ans. 9).

Appellants contend that the “mere suggestion of interchanging and combining steps in Geisendoerfer would not have led a skilled artisan to manipulate an amount of recycled catalyst on the basis of current catalyst activity” (App. Br. 11). Thus, Appellants argue, “[a]bsent disclosure or suggestion of selecting an amount of catalyst that is to be recycled on the

basis of catalytic activity, Geisendoerfer would not have rendered obvious claims 1-3" (*id.*).

Regarding claims 20-22, Appellants contend that Geisendoerfer does not directly recycle, to its reaction apparatus, products which are analogous to the products recycled in claims 20-22 (*id.* at 12). Specifically, Appellants argue, Geisendoerfer discloses that "the bottom products from analogous features to those recited in claims 20-22 are not recycled to a reaction apparatus, but rather subjected to a residue work-up" (*id.* at 12-13 (citing Geisendoerfer [0192] to [0201])).

In view of the positions advanced by Appellants and the Examiner, the issues with respect to this rejection are:

(a) Whether an ordinary artisan viewing the relevant teachings of Geisendoerfer would have been prompted to include in the process described by that reference a step of "selecting a proportion of the bottom effluent [from a vacuum evaporation stage and/or film evaporator] that will constitute the first portion *based on current catalyst activity*" (emphasis added) as recited in claims 1-3; and

(b) Whether an ordinary artisan viewing the relevant disclosures of Geisendoerfer would have viewed the reference as teaching a step in which a portion of bottom effluent from a vacuum evaporation stage and/or film evaporator "is recycled directly to the reaction apparatus" as recited in claims 20-22.

FINDINGS OF FACT

14. Geisendoerfer discloses that, in prior art processes in which higher (meth)acrylates are prepared by transesterification of a lower (meth)acrylate with a higher alcohol, one shortcoming is that "recycling of the starting ester

may be complicated or even prevented by the entrainment of impurities, for example by the catalyst" (Geisendoerfer [0005]).

15. Geisendoerfer discloses that, even though it escapes into the product stream, the lower (meth)acrylate ester starting material can be rendered suitable for recycling back to the reaction apparatus as follows:

either first substantially (meth)acrylate I is separated off and is then separated by distillation from the catalyst used (catalyst removal),

or is first separated by distillation from the catalyst used (catalyst removal) and then substantially (meth)acrylate I is separated off

and then components having a lower boiling point than the (meth)acrylate IV are substantially separated from the resulting mixture by distillation (low boiler removal) and then the (meth)acrylate IV is purified by distillation (distillative purification).

(*Id.* at [0082]-[0084].)

16. Geisendoerfer discloses that, to remove the catalyst, the "transesterification mixture substantially freed from the lower (meth)acrylate is subjected to a distillation or rectification, preferably a thin-film or flash evaporation" (*id.* at [0167]).

17. Geisendoerfer discloses that, "[t]here, substantially the desired ester IV and low boilers (e.g. starting materials) distill off and a bottom product which mainly comprises catalyst, stabilizers and Michael adducts is obtained. This bottom mixture to [sic, may?] be recycled partly, preferably in an amount of 60-95%, into the transesterification" (*id.* at [0169]-[0170]).

18. Geisendoerfer discloses that it "may also be expedient . . . first to separate the discharge from the transesterification . . . from the bottom product which mainly comprises catalyst, stabilizer and Michael adducts,

and then to separate off substantially the lower alkanol and the lower (meth)acrylate in a distillation or rectification" (*id.* at [0171]).

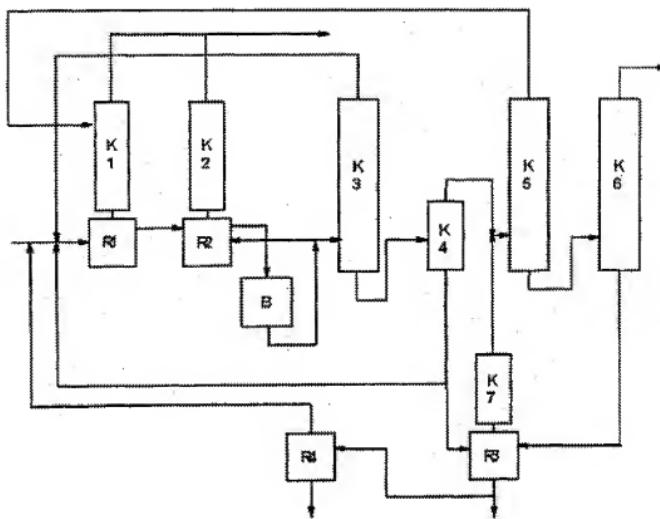
19. Geisendoerfer discloses that separating off the bottom product first ultimately "has the advantage that the reaction mixture is exposed to the catalyst for a shorter time so that catalyst-induced secondary or subsequent reactions are reduced" (*id.* at [0172]).

20. Geisendoerfer discloses that, when performing the last stages of distilling the pure ester, it is "possible for the distillate containing the desired ester . . . , if required in combination with the distillate from the residue treatment, to be separated in a further distillation unit" (*id.* at [0190]).

21. In addition to producing a fraction that "substantially comprises the desired ester," this distillation unit produces "a low boiler fraction, which mainly comprises the lower and higher (meth)acrylate and higher alcohol and can be recycled to the transesterification" (*id.*).

22. This distillation unit is described as having a pressure of 100-200 mbar (*id.* at [0191]), and Appellants do not dispute that such pressure would constitute a vacuum.

23. Figure 1 of Geisendoerfer is reproduced below:



The figure shows a schematic representation of Geisendoerfer's process. As can be seen in the figure, apparatus K4, described by Geisendoerfer as either a thin-film or flash evaporator (*id. at [0167]*), emits a bottom effluent which is divided into two portions, one of which is recycled to the reaction apparatuses R1 and R2 without any intervening processing apparatuses.

As also can be seen in the figure, the bottom effluent from apparatuses K5 and K6, which correspond to the vacuum evaporator cited by the Examiner (FF 19-21), passes through residue treatment

apparatuses R3 and R4 before being recycled to the reaction apparatuses.

PRINCIPLES OF LAW

In *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 415 (2007), the Supreme Court emphasized “an expansive and flexible approach” to the obviousness question. The Court nonetheless reaffirmed that:

[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements *in the way the claimed new invention does . . .* because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.

Id. at 418-419 (emphasis added); *see also id.* at 418 (requiring a determination of “whether there was an apparent reason to combine the known elements *in the fashion claimed* by the patent at issue”) (emphasis added).

Ultimately, therefore, as the Federal Circuit has stated, “[i]n determining whether obviousness is established by combining the teachings of the prior art, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *In re GPAC Inc.*, 57 F.3d 1573, 1581 (Fed. Cir. 1995) (internal quotations omitted).

ANALYSIS

We agree with Appellants that the Examiner has not shown that an ordinary artisan viewing the relevant teachings of Geisendoerfer would have been prompted to include in the process described by that reference a step of “selecting a proportion of the bottom effluent [from a vacuum evaporation

stage and/or film evaporator] that will constitute the first portion based on current catalyst activity” as recited in claims 1-3.

We note that Geisendoerfer is concerned with minimizing the exposure of the reaction mixture to the catalyst (*see* FF 14-16). We also note that the catalyst-containing bottom effluent from the thin-film evaporation stage (K4) may be recycled to the reaction apparatus (FF 17, 23), and that separating the catalyst from the product stream is desirable because it minimizes the production of undesired side products (FF 18-19).

However, as discussed above regarding the indefiniteness rejection, we conclude that a skilled artisan viewing claims 1-3 in light of the Specification would reasonably interpret the “selecting” step to require the practitioner to measure current catalyst activity in the reaction apparatus, for example by the described methods, and to adjust the amount of effluent recycled to the reaction apparatus based on the amount of catalyst activity remaining.

Thus, while it may be true that Geisendoerfer is concerned with the catalytic activity present in its product stream, the Examiner does not point to, and we do not see, any specific teachings in the reference regarding measuring the catalytic activity in the reaction apparatus. Nor does the Examiner point to any specific teaching in Geisendoerfer suggesting that the amounts of the bottom effluents recycled from either the film evaporator or the vacuum evaporator should be varied as a function of the catalytic activity measured in the reaction apparatus.

Accordingly, even assuming for argument’s sake that an ordinary artisan was prompted to optimize the catalyst activity in the reaction apparatus, we are not persuaded that Geisendoerfer would have suggested to

an ordinary artisan that it would be useful, or even desirable, to use that parameter to determine how much of the bottom effluent should be recycled from either the thin-film or vacuum evaporators. Because we are not persuaded that Geisendoerfer suggests all of the steps recited in claims 1-3, we reverse the Examiner's obviousness rejection of those claims, and their dependents, over that reference.

We also agree with Appellants that an ordinary artisan viewing the relevant disclosures of Geisendoerfer would not have viewed the reference as teaching a step in which a portion of bottom effluent from a vacuum evaporation stage "is recycled directly to the reaction apparatus" as recited in claims 20 and 22. Specifically, both claims 20 and 22 require the bottom effluent from vacuum evaporation state to be divided into two portions, one of which is recycled directly to the reaction apparatus.

As noted above, the bottom effluent from apparatuses K5 and K6, which correspond to the vacuum evaporator cited by the Examiner (FF 20-22), passes through residue treatment apparatuses R3 and R4 before being recycled to the reaction apparatuses R1 and R2 (FF 23). As the Examiner does not point to, and we do not see, any disclosure that remedies this deficiency in Geisendoerfer, we reverse the Examiner's obviousness rejection of claims 20 and 22 over that reference.

Claim 21, however, recites that the bottom effluent from a film evaporator is divided into two portions, one of which is recycled directly to the reaction apparatus. As noted above, apparatus K4, described by Geisendoerfer as either a thin-film or flash evaporator, emits a bottom effluent which is divided into two portions, one of which is recycled to the reaction apparatuses R1 and R2 without any intervening processing

apparatuses (FF 23). We therefore agree with the Examiner that Geisendoerfer suggests the process recited in claim 21.

While it may be true that the preamble of claim 21 recites that the film evaporator is “for separating a highly pure ester product,” we are not persuaded that the preamble’s statement of intended use fails to encompass evaporator K4 in Geisendoerfer’s process. Specifically, evaporator K4 is in fact part of a system whose intended effect is the production of a highly pure ester product.

Moreover, the distillate produced by evaporator K4 is described as containing “substantially the desired ester IV and low boilers (e.g. starting materials” (FF 17)), and at that point the product has already undergone several purification steps, including steps of removing catalyst and reactants (*see* FF 14-16). We are therefore not persuaded that claim 21 is distinguishable from the process suggested by Geisendoerfer.

Accordingly, we affirm the Examiner’s obviousness rejection of claim 21 over Geisendoerfer.

SUMMARY

We reverse the Examiner’s rejection of claim 20, under 35 U.S.C. § 112, first paragraph, for lack of written description, but affirm the Examiner’s rejection of claims 21 and 22 under that ground.

We reverse the Examiner’s rejection of claims 1-3, under 35 U.S.C. § 112, second paragraph, for indefiniteness.

We reverse the Examiner’s rejection of claims 1-20 and 22, under 35 U.S.C. § 103(a), as obvious over Geisendoerfer.

However, we affirm the Examiner’s rejection of claim 21 as obvious over Geisendoerfer.

TIME PERIOD

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED-IN-PART

cdc

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